5G mobile Networks Development
Regulatory emerging issues

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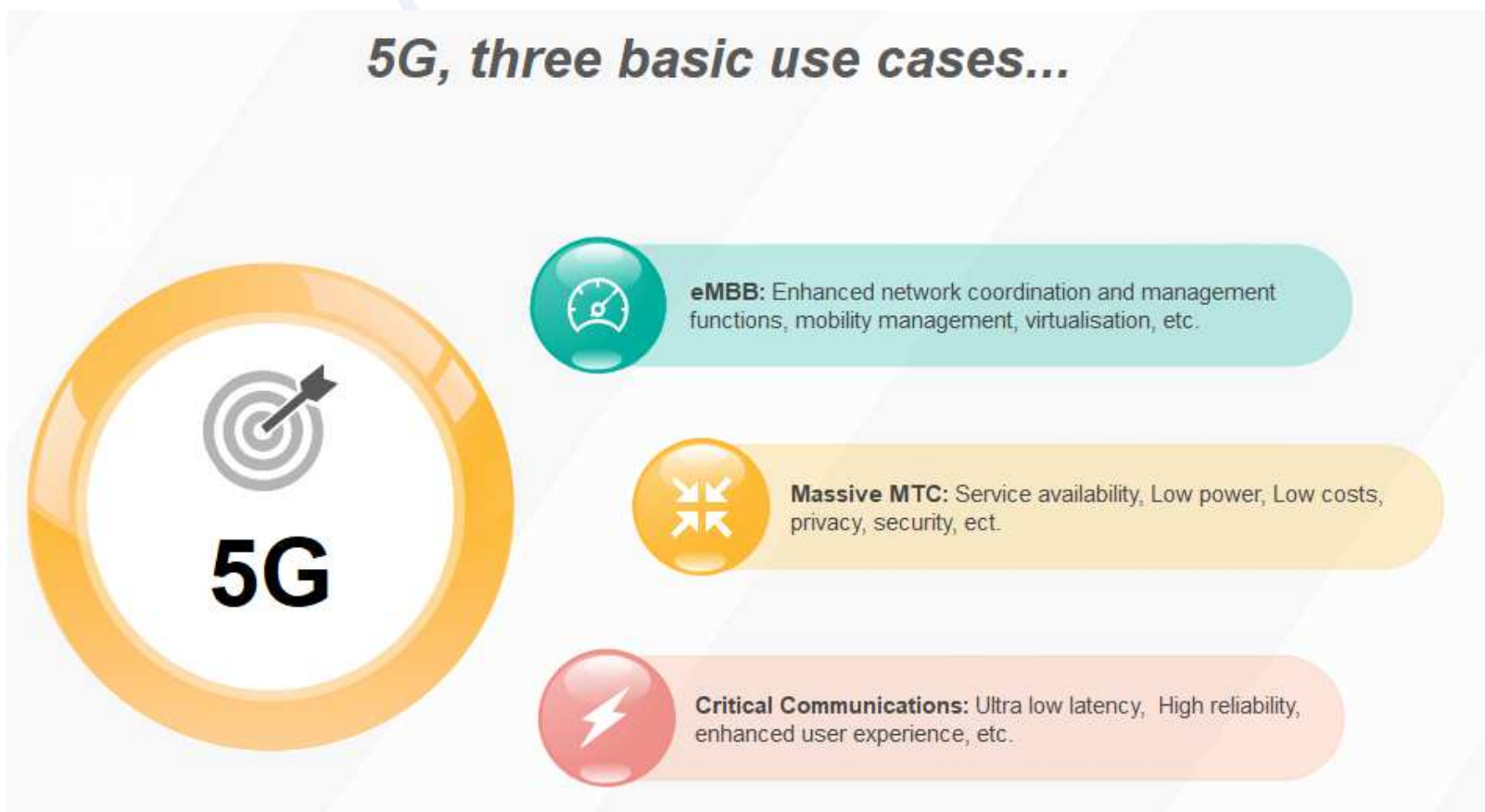sihem.trabelsi@intt.tn

Agenda

1 Introduction

2 5G: technological enablers

3 Regulatory requirements

4 Conclusion

Introduction (1/2)

5G, three basic use cases...

5G

eMBB: Enhanced network coordination and management functions, mobility management, virtualisation, etc.

Massive MTC: Service availability, Low power, Low costs, privacy, security, ect.

Critical Communications: Ultra low latency, High reliability, enhanced user experience, etc.
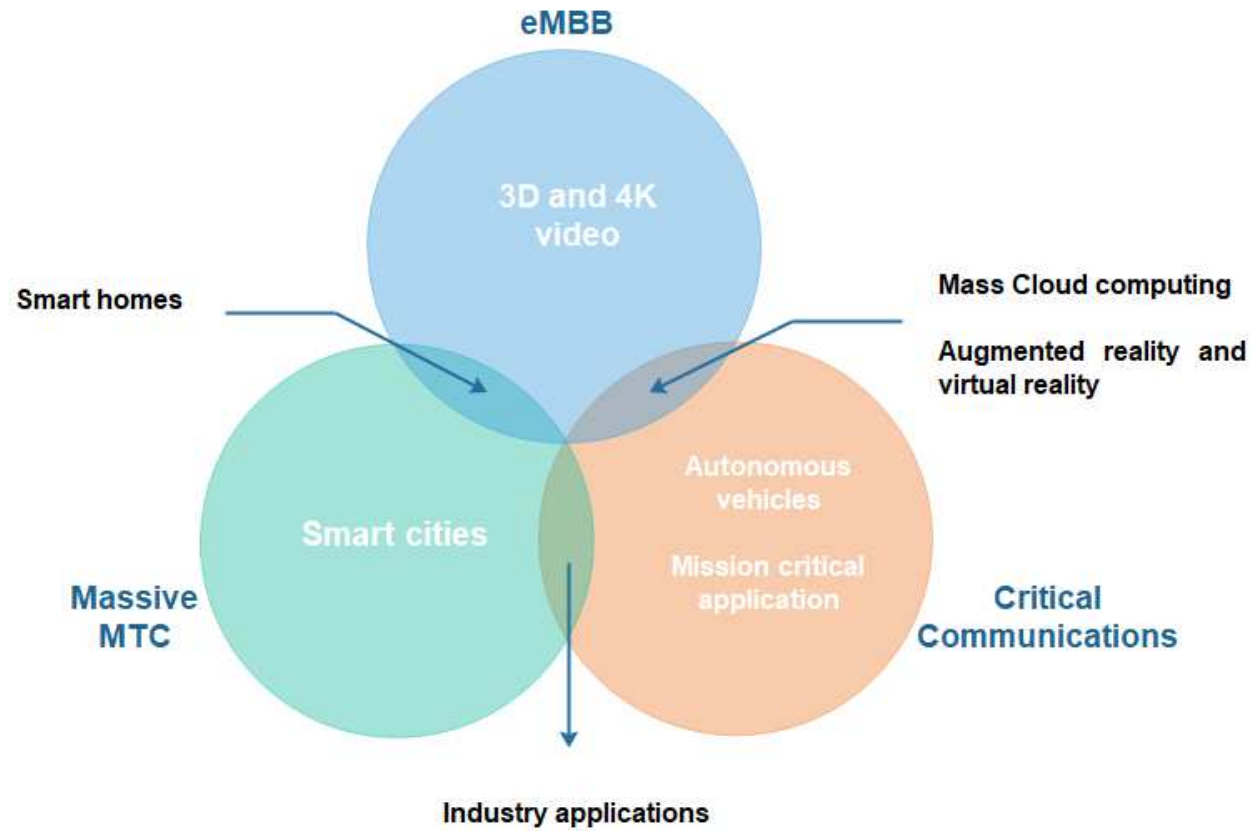
Introduction (2/2)

5G, services and applications

Technological enablers (1/3)
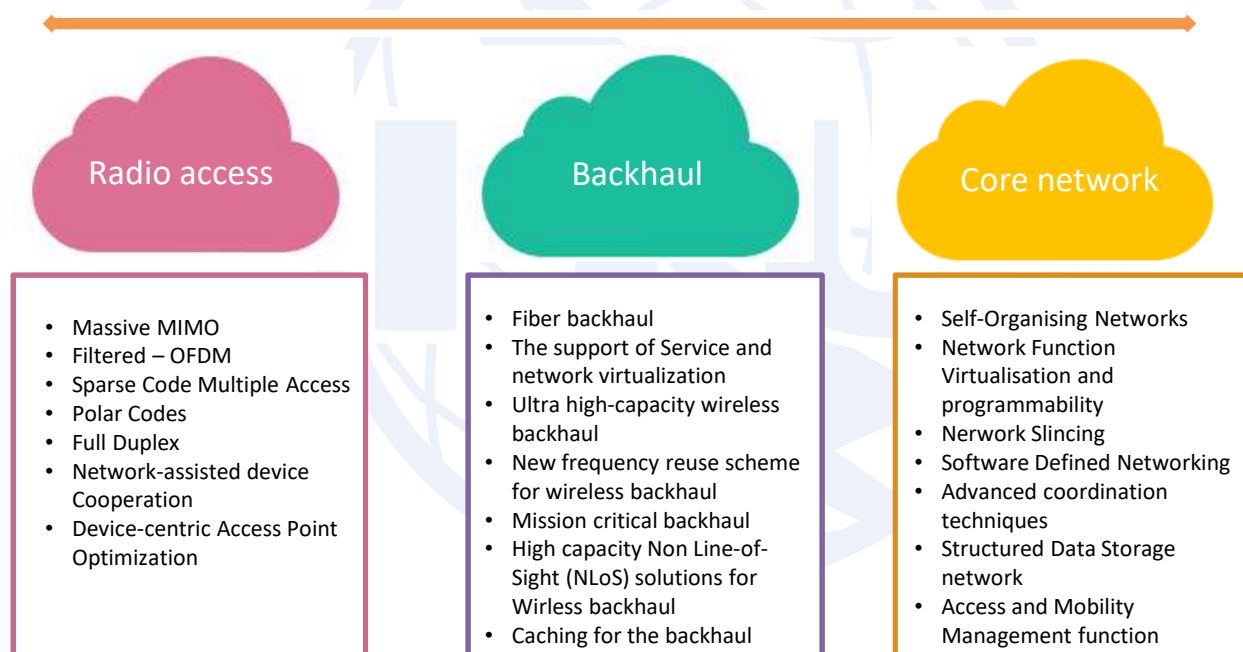## Technical developments

- Massive MIMO

- Enhanced RAN capabilities

- Shared spectrum access

- Advanced Inter-node coordination

- Simultaneous Transmission Reception

- Multi RAT Integration & management

- New waveforms

- Context aware networking

- Flexible networks

- Moving networks

- Information centric networks

- Enhanced backhauling capabilities

- Efficient small data transmission
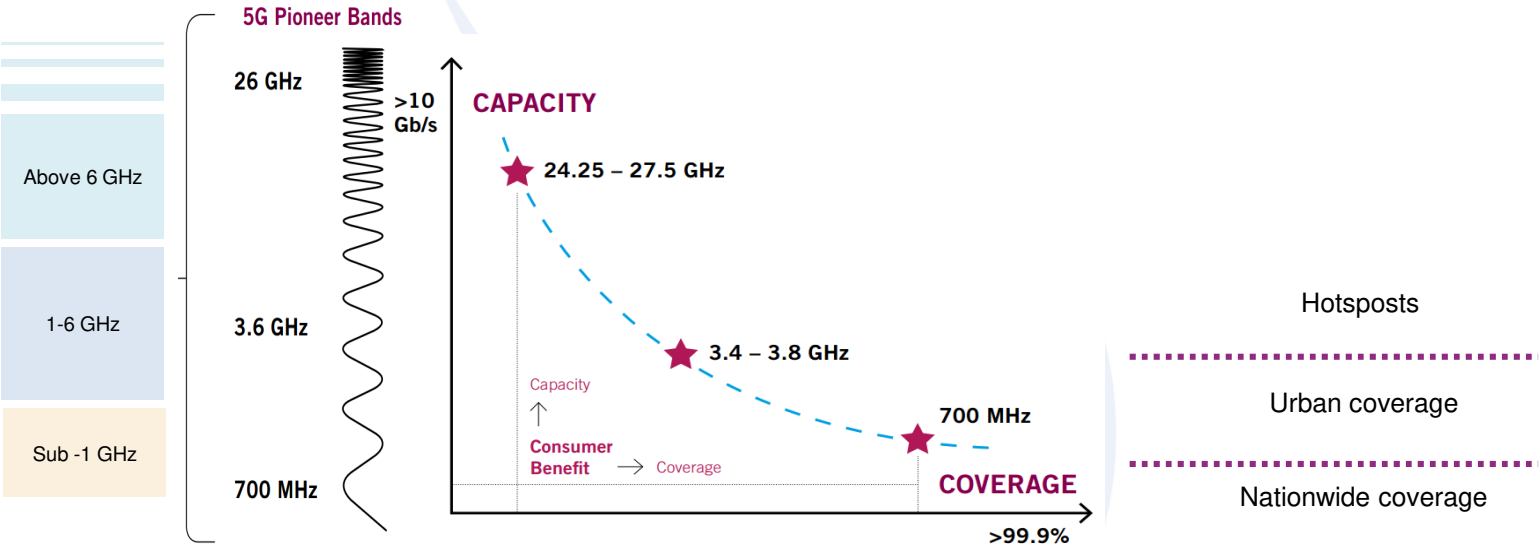
Technological enablers (2/3)
Network Infrastructure and topology

Flexible, customizable, scalable and context aware networks

Radio access
- Massive MIMO
- Filtered – OFDM
- Sparse Code Multiple Access
- Polar Codes
- Full Duplex
- Network-assisted device Cooperation
- Device-centric Access Point Optimization

Backhaul
- Fiber backhaul
- The support of Service and network virtualization
- Ultra high-capacity wireless backhaul
- New frequency reuse scheme for wireless backhaul
- Mission critical backhaul
- High capacity Non Line-of-Sight (NLoS) solutions for Wirless backhaul
- Caching for the backhaul

Core network
- Self-Organising Networks
- Network Function Virtualisation and programmability
- Nerwork Slincing
- Software Defined Networking
- Advanced coordination techniques
- Structured Data Storage network
- Access and Mobility Management function

Technological enablers (3/3)
Spectrum

5G Pioneer Bands

Above 6 GHz

1-6 GHz

Sub -1 GHz

26 GHz

3.6 GHz

700 MHz

>10 Gb/s

CAPACITY

24.25 – 27.5 GHz

3.4 – 3.8 GHz

700 MHz

Capacity ↑

Consumer Benefit → Coverage

COVERAGE

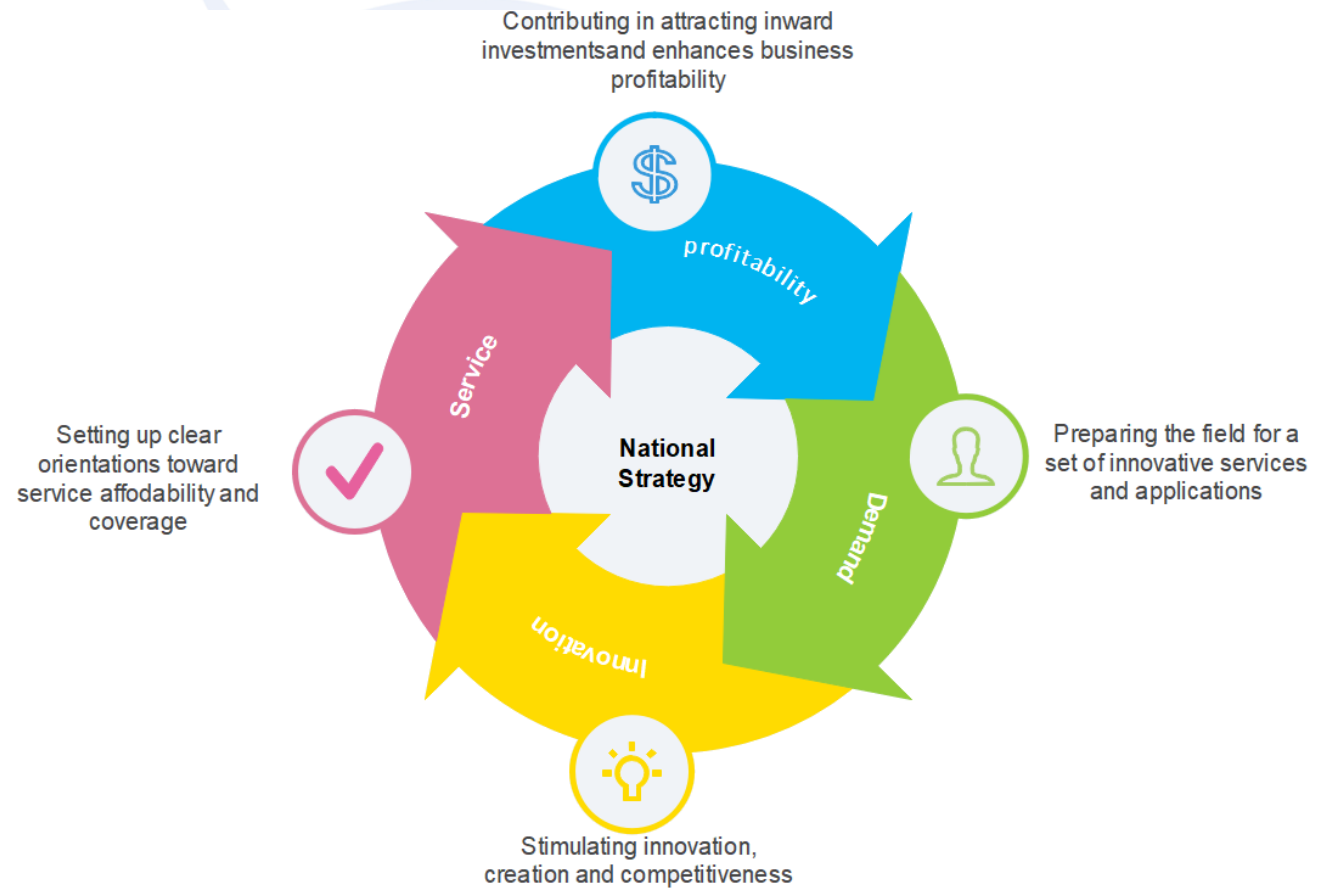>99.9%

Hotsposts

Urban coverage

Nationwide coverage

Main recommandations for governments and regulators

1 Making spectrum available in a timely manner

2 Engaging in international spectrum harmonisation activities

3 Consider technological neutrality in spectrum licenses

4 Adopt national policy measures to encourage investments in 5G

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The need for national strategies

Why do we need a 5G national strategy ?

Contributing in attracting inward investmentsand enhances business profitability

profitability

Preparing the field for a set of innovative services and applications

Demand

National Strategy

Service

Innovation

Setting up clear orientations toward service affodability and coverage

Stimulating innovation, creation and competitiveness

Tunisian National Digital Strategy (1/3)

National strategic plan « Tunisie Digitale 2020 »...

Strategic orientations ...

Tunisian National Digital Strategy (2/3)

National strategic plan « *Tunisie Digitale 2020* »…

Four programs …

Infrastructure	e-Business	e-Gov	Smart Tunisia
Infrastructure	e-Business Usages Innovation	e-Administration	Offshoring
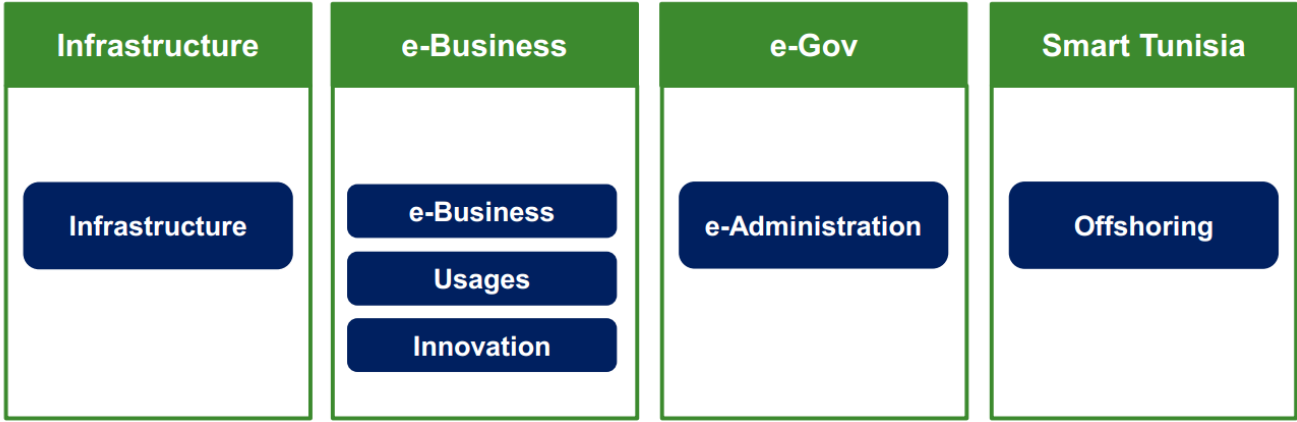
Tunisian National Digital Strategy (3/3)

Main objectives by 2020

- Ranking according to NRI : 1st in Africa and 4th in the arab region

- 60% of households connected to broadband

- 50% as mobile broadband penetration rate

- Encourage PPP (1/3 of Investment made by public sector and 2/3 by private sector)

- Initiate the transition to a paperless administration
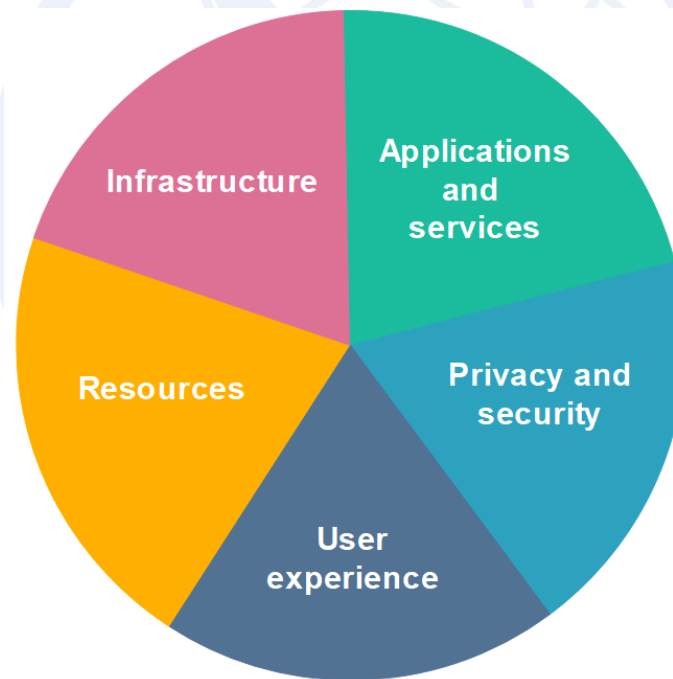
- Etc.

Regulatory framework

Innovative regulatory framework principles

01	Participatory/ Open to stakeholders' views

02	Proactive, which anticipates innovation

03	Encourages entrepreneurship and initiative

Regulatory requirements

5 Pillars …..

Regulatory requirements (1/5)
Infrastructure

Mobile:

- Focus on securing reliable universal coverage as well as high capacity urban coverage

- Encourage radio access network (RAN) sharing with Open Hosting

- Consider Wifi offload as an alternative to widen the 5G coverage

Fixed:

- Tackle passive Infrastructure access issue (ducts, poles etc.) to deliver the benefits of 5G to the largest number of consumers (include all public utility facility owners)

- Encourage active network sharing for fiber backhaul


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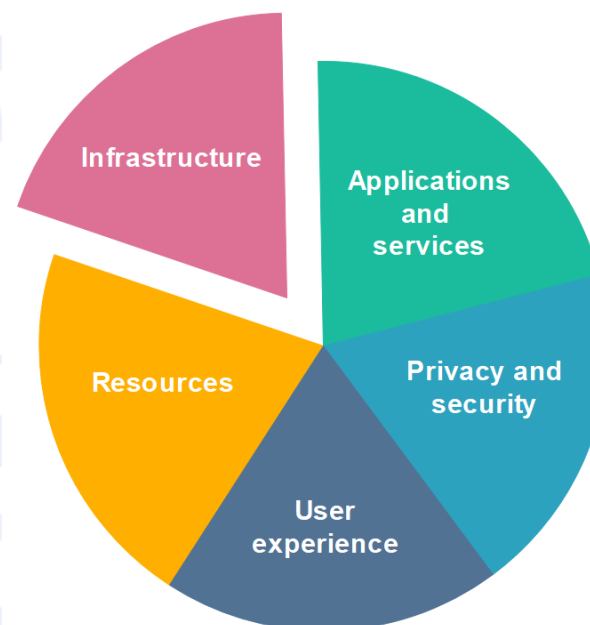
Regulatory requirements (2/5)
Resources

Frequencies:

- Ensure the availability of spectrum in a timely manner

- Ensuring mobile licenses are technology and service neutral to encourage 5G upgrades

IPv6 addresses:

- Ensure the availabilty of addressing resources for the need of new services (IoT, M2M, etc)

- Accelerate the adoption of the IPv6 through the elaboration of a national roadmap
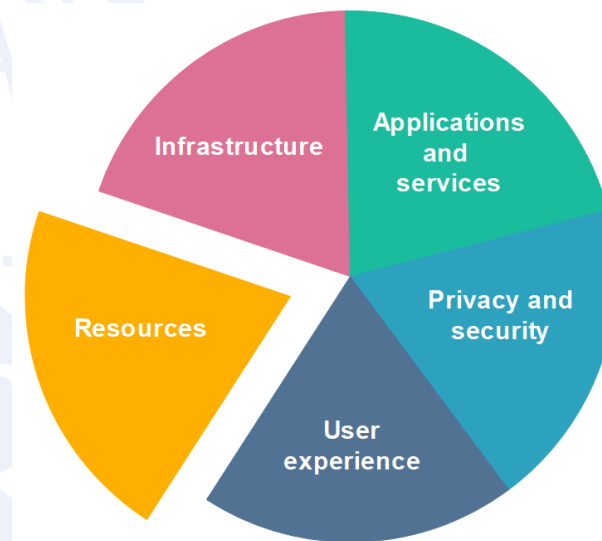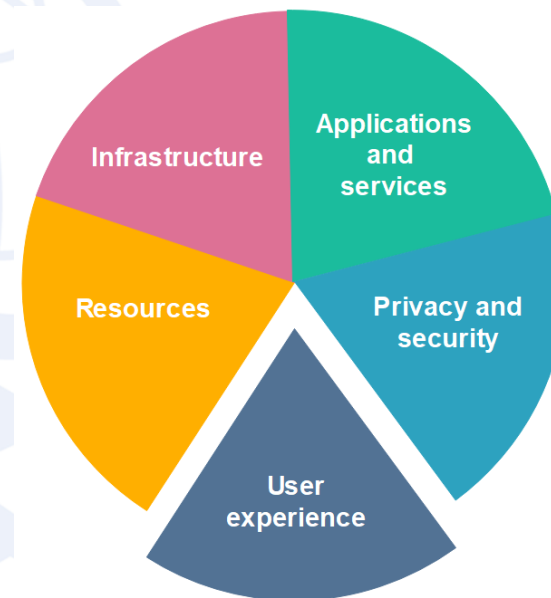
Regulatory requirements (3/5)
User Experience

Issues:

- The need to work on the "*Coverage maximization*"

- Focus on the "*Quality of coverage*"

KPI:

- Availability
- Bandwidth
- Cell-edge user throughput
- Connection density
- Control plane latency
- End-to-end latency
- Coverage area probability
- Energy efficiency
- Mobility
- Reliability
- Etc,

Regulatory requirements (4/5)
Privacy and Security

Privacy:

- There is a need to adopt international standards regarding personal data protection

- This issue is particularly important with the IoT services

Security:

- Comprehensive security architecture is essential to take care of security challenges

- All stakeholders and research community need to work together to form a security ecosystem
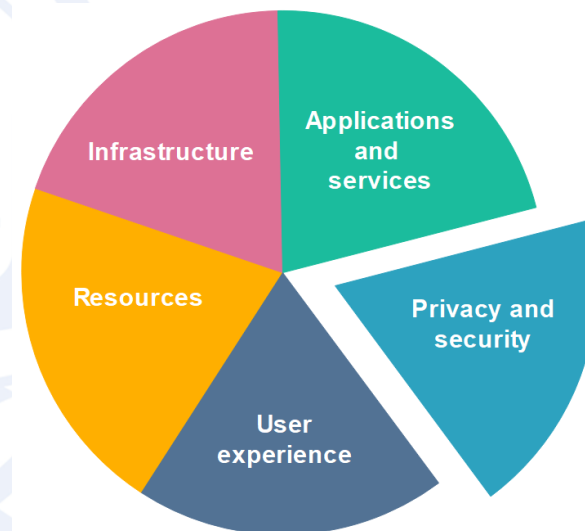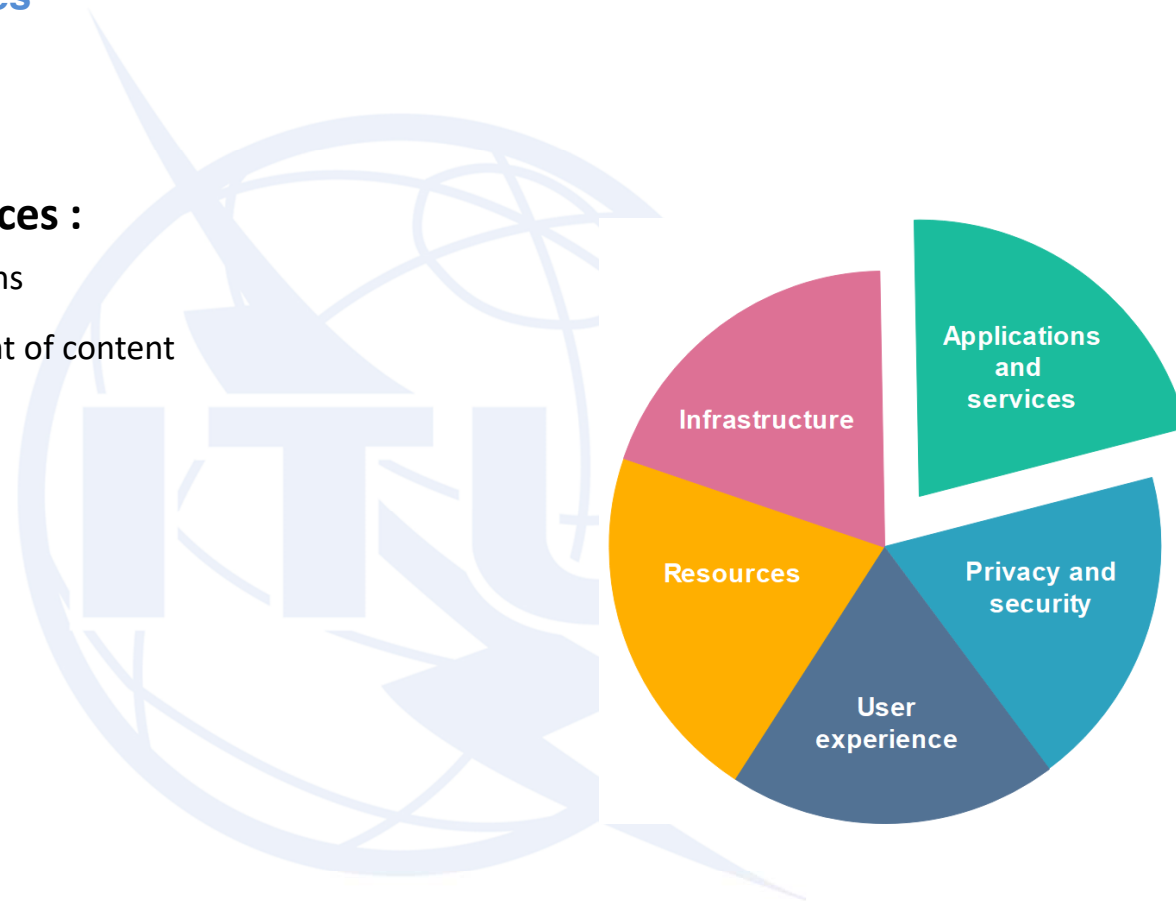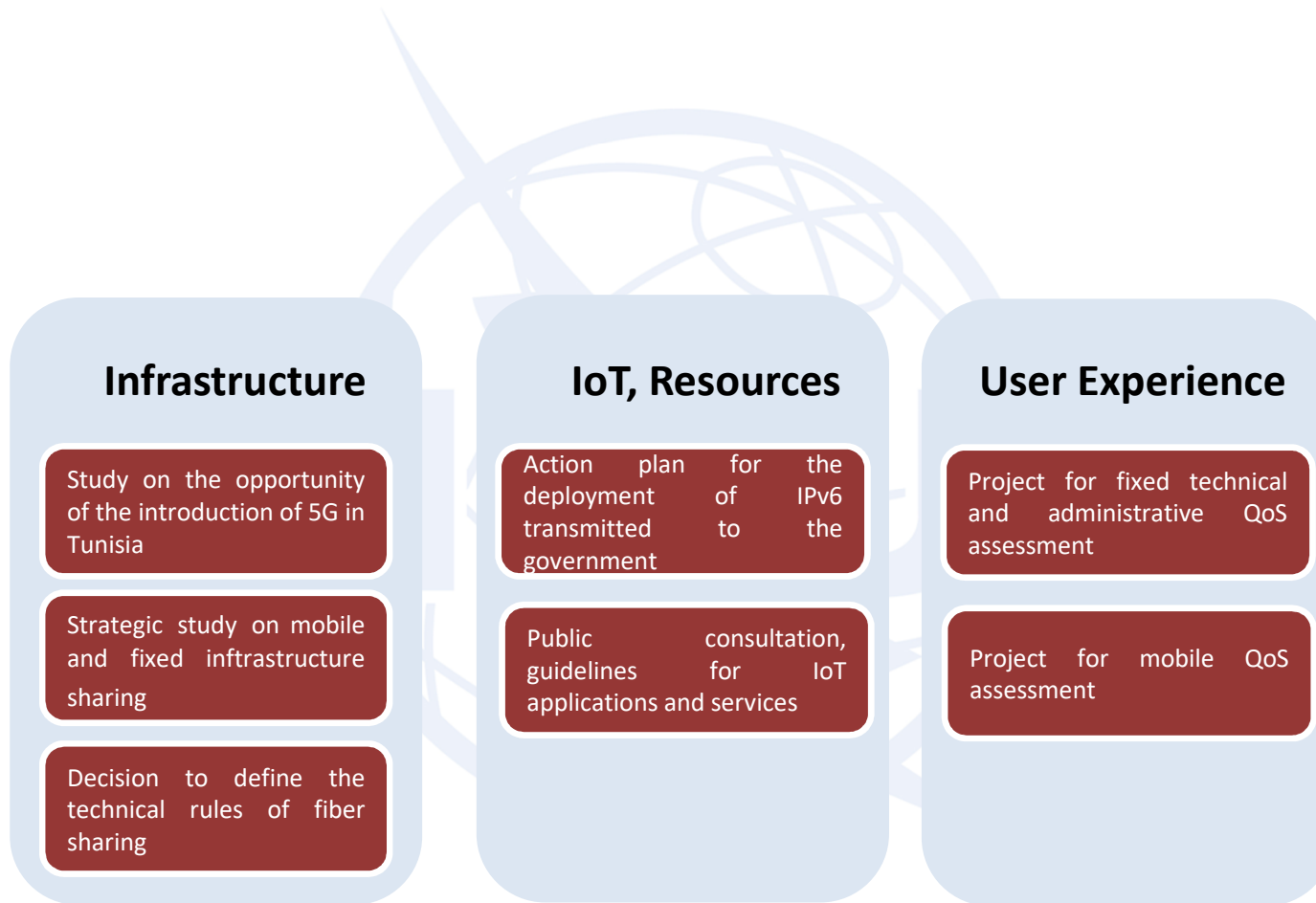
Regulatory requirements (5/5)
Applications and services

Applications and services :

- Enabling the IoT applications

- Encourage the development of content

- Promote net-neutrality

INTT's projects in 2019

Infrastructure

Study on the opportunity of the introduction of 5G in Tunisia

Strategic study on mobile and fixed inffratructure sharing

Decision to define the technical rules of fiber sharing

IoT, Resources

Action plan for the deployment of IPv6 transmitted to the government

Public consultation, guidelines for IoT applications and services

User Experience

Project for fixed technical and administrative QoS assessment

Project for mobile QoS assessment

Thank you

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